Listing of Claims

This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently Amended) A method of controlling the nitrogen content of a silicon carbide crystal grown by sublimation, the method comprising:

introducing an ambient gas ~~containing~~ consisting of hydrogen into a sublimation growth chamber holding a seed crystal;

heating a silicon carbide source powder to sublimation in the hydrogen ambient growth chamber while,

maintaining the silicon carbide source powder at a temperature of between about 2000°C and 2500°C and maintaining the seed crystal at a temperature of between about 50°C and 350°C lower than the temperature of the source powder, at which temperature sublimed species from the source powder will condense upon the seed crystal,

continuing to heat the silicon carbide source powder until a desired amount of silicon carbide crystal growth has occurred upon the seed crystal,

while reducing the amount of nitrogen incorporated into the growing silicon carbide crystal by controlling the hydrogen concentration in the ambient atmosphere of the growth chamber.

2. (Original) A method according to Claim 1 comprising introducing the ambient hydrogen into the growth chamber at a pressure of between about 0.1 and 50 Torr.

3. (Original) A method according to Claim 1 comprising introducing the ambient hydrogen at a flow rate of between about 10 and 1000 standard cubic centimeters per minute.

4. (Original) A method according to Claim 1 comprising heating a seed crystal having a polytype selected from the group consisting of the 3C, 4H, 6H, and 15R polytype of silicon carbide.

5. (Canceled)

6. (Original) A method according to Claim 1 comprising introducing a sufficient amount of ambient hydrogen into the growth chamber to yield a growing silicon carbide crystal with less than about 2×10^{15} nitrogen atoms per cubic centimeter.

7. (Original) A method according to Claim 1 comprising introducing a sufficient amount of ambient hydrogen into the growth chamber to yield a growing silicon carbide crystal with less than about 1×10^{15} nitrogen atoms per cubic centimeter.

8. (Canceled)

9. (Withdrawn) A semi-insulating silicon carbide crystal produced by the method of Claim 1 having a nitrogen concentration less than about 2×10^{15} nitrogen atoms per cubic centimeter.

10. (Withdrawn) A semi-insulating silicon carbide crystal produced by the method of Claim 1 having a nitrogen concentration less than about 1×10^{15} nitrogen atoms per cubic centimeter.

11. (Currently Amended) A method of controlling the nitrogen content of a silicon carbide crystal grown by sublimation, the method comprising:

introducing an ambient gas ~~containing~~ consisting of hydrogen into a sublimation growth chamber holding a seed crystal;

heating a silicon carbide source powder to sublimation in the hydrogen ambient growth chamber while,

maintaining the silicon carbide source powder at a temperature of between about 2000°C and 2500°C and maintaining the seed crystal at a temperature of between about 50°C and 350°C lower than the temperature of the source powder, at which temperature sublimed species from the source powder will condense upon the seed crystal;

continuing to heat the silicon carbide source powder until a desired amount of silicon carbide crystal growth has occurred upon the seed crystal,

while maintaining an ambient concentration of hydrogen in the growth chamber sufficient to passivate the growing silicon carbide crystal against the incorporation of nitrogen to thereby reduce the amount of nitrogen incorporated into the growing silicon carbide crystal.

12. (Original) A method according to Claim 11 comprising introducing the ambient hydrogen into the growth chamber at a pressure of between about 0.1 and 50 Torr.

13. (Original) A method according to Claim 11 comprising introducing the ambient hydrogen at a flow rate of between about 10 and 1000 standard cubic centimeters per minute.

14. Canceled

15. (Original) A method according to Claim 11 comprising heating a seed crystal having a polytype selected from the group consisting of the 3C, 4H, 6H, and 15R polytype of silicon carbide.

16. (Original) A method according to Claim 11 comprising introducing a sufficient amount of ambient hydrogen into the growth chamber to yield a growing crystal with less than about 2×10^{15} nitrogen atoms per cubic centimeter.

17. (Original) A method according to Claim 11 comprising introducing a sufficient amount of ambient hydrogen into the growth chamber to yield a growing crystal with less than about 1×10^{15} nitrogen atoms per cubic centimeter.

18. (Original) A method according to Claim 11 comprising introducing a hydrocarbon species to the growth chamber to establish the hydrogen ambient.

19. (Original) A semi-insulating silicon carbide crystal produced by the method of Claim 11 having a nitrogen concentration of less than about 2×10^{15} nitrogen atoms per cubic centimeter.

20. (Withdrawn) A semi-insulating silicon carbide crystal produced by the method of Claim 11 having a nitrogen concentration of less than about 1 x 10^{15} nitrogen atoms per cubic centimeter.

21. (Currently Amended) A method of controlling the nitrogen content of a silicon carbide crystal grown by sublimation, the method comprising:

heating a silicon carbide source powder to a temperature of between about 2000°C and 2500°C,

heating and maintaining a silicon carbide seed crystal at a temperature of between about 50°C and 350°C lower than the temperature of the source powder, at which temperature sublimed species from the source powder condense upon the seed crystal to form a continuously expanding growth surface of silicon carbide crystal; and while

introducing an ambient gas consisting of hydrogen into a sublimation growth chamber holding a seed crystal, thereby passivating the silicon carbide growth surface with hydrogen atoms~~,~~ and controlling ~~to control~~ the incorporation of nitrogen from the ambient atmosphere into a resulting silicon carbide crystal.

22. (Original) A method according to Claim 21 comprising passivating the growth surface with hydrogen atoms by establishing a hydrogen ambient atmosphere in the growth chamber.

23. (Canceled)

24. (Original) A method according to Claim 21 comprising passivating the growth surface with hydrogen atoms by adding hydrogen to the ambient atmosphere at a pressure of between about 0.1 and 50 Torr.

25. (Original) A method according to Claim 21 comprising passivating the growth surface with hydrogen atoms by adding hydrogen to the ambient atmosphere at a flow rate of between about 10 and 1000 standard cubic centimeters per minute.

26. (Canceled)

27. (Original) A method according to Claim 21 comprising heating a seed crystal having a polytype selected from the group consisting of the 3C, 4H, 6H, and 15R polytype of silicon carbide.

28. (Original) A method according to Claim 21 comprising maintaining an ambient concentration of hydrogen in the growth chamber that yields a growing crystal with less than about 2×10^{15} nitrogen atoms per cubic centimeter.

29. (Original) A method according to Claim 21 comprising maintaining an ambient concentration of hydrogen in the growth chamber that yields a growing crystal with less than about 1×10^{15} nitrogen atoms per cubic centimeter.

30. (Withdrawn) A semi-insulating silicon carbide crystal produced by the method of Claim 21 having a nitrogen concentration of less than about 2×10^{15} nitrogen atoms per cubic centimeter.

31. (Withdrawn) A semi-insulating silicon carbide crystal produced by the method of Claim 21 having a nitrogen concentration of less than about 1×10^{15} nitrogen atoms per cubic centimeter.

32. Canceled.

33. (New) A method of controlling the nitrogen content of a silicon carbide crystal grown by sublimation, the method comprising:

introducing an ambient gas consisting of a gaseous hydrocarbon into a sublimation growth chamber holding a seed crystal;

heating a silicon carbide source powder to sublimation in the hydrogen ambient growth chamber while,

maintaining the silicon carbide source powder at a temperature of between about 2000°C and 2500°C and maintaining the seed crystal at a temperature of between about 50°C and 350°C lower than the temperature of the source powder, at which temperature sublimed species from the source powder will condense upon the seed crystal,

continuing to heat the silicon carbide source powder until a desired amount of silicon carbide crystal growth has occurred upon the seed crystal,

while reducing the amount of nitrogen incorporated into the growing silicon carbide crystal by controlling the hydrogen concentration in the ambient atmosphere of the growth chamber.

34. (New) A method according to Claim 33, comprising introducing the ambient hydrocarbon into the growth chamber at a pressure of between about 0.1 and 50 Torr.

35. (New) A method according to Claim 33 comprising introducing the ambient hydrocarbon at a flow rate of between about 10 and 1000 standard cubic centimeters per minute.

36. (New) A method according to Claim 33 comprising heating a seed crystal having a polytype selected from the group consisting of the 3C, 4H, 6H, and 15R polytype of silicon carbide.

37. (New) A method according to Claim 33 comprising introducing a sufficient amount of the ambient hydrocarbon into the growth chamber to yield a growing silicon carbide crystal with less than about 2×10^{15} nitrogen atoms per cubic centimeter.

38. (New) A method according to Claim 33 comprising introducing a sufficient amount of the ambient hydrocarbon into the growth chamber to yield a growing silicon carbide crystal with less than about 1×10^{15} nitrogen atoms per cubic centimeter.